BROOKHAVEN NATIONAL LABORATORY

Work Permit #
Work Order # _____
Job# _____ Activity# _____

1. Work requester fills out this section. ☐ **Standing Work Permit**

Requester: Don Lynch	Date: 7/5/2006	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Sal Marino			Ext.: 3704
Work Control Coordinator: Don Lynch		Start Date: 8/1/2006	Est. End Date: 10/30/2006
Brief Description of Work: Install HBD Detector in IR			
Building: 1008	Room: IR	Equipment: n/a	Service Provider: PHENIX Techs

. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

ES&H ANALYSIS				
Radiation Concerns	☐ None	☐ Activation	☐ Airborne	☐ Contamination	☒ Radiation
Radiation Generating Devices:	☐ Radiography	☐ Moisture Density Gauges	☐ Soil Density Gauges	☐ X-ray Equipment
☐ Special nuclear materials involved, notify Isotope Special Materials Group			☐ Fissionable materials involved, notify Laboratory Criticality Officer	
Safety Concerns	☐ None	☐ Ergonomics	☐ Transport of Haz/Rad Material	
☐ Adding/Removing Walls or Roofs	☐ Confined Space*	☐ Explosives	☐ Lead*	☐ Penetrating Fire Walls
	☐ Corrosive	☐ Flammable	☐ Magnetic Field*	☐ Pressurized Systems
☐ Asbestos*	☐ Cryogenic	☐ Fumes/Mist/Dust*	☐ Material Handling	☐ Rigging/Critical Lift
☐ Beryllium*	☐ Electrical	☐ Heat/Cold Stress	☐ Noise*	☐ Toxic Materials*
☐ Biohazard*	☐ Elevated Work*	☐ Hydraulic	☐ Non-ionizing Radiation*	☐ Vacuum
☐ Chemicals*	☐ Excavation	☐ Lasers*	☐ Oxygen Deficiency*	☒ Other UV Lamp
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? ☐ Yes ☐ No				
Environmental Concerns		☒ None	☐ Work impacts Environmental Permit No.	
☐ Atmospheric Discharges (rad/non-rad)		☐ Land Use	☐ Soil Activation/contamination	☐ Waste-Mixed
☐ Chemical or Rad Material Storage or Use		☐ Liquid Discharges	☐ Waste-Clean	☐ Waste-Radioactive
☐ Cesspools (UIC)		☐ Oil/PCB Management	☐ Waste-Hazardous	☐ Waste-Regulated Medical
☐ High water/power consumption		☐ Spill potential	☐ Waste-Industrial	☐ Underground Duct/Piping
Waste disposition by:				☐ Other
Pollution Prevention (P2)/Waste Minimization Opportunity:		☒ None ☐ Yes		
FACILITY CONCERNS	☒ None			
☐ Access/Egress Limitations	☐ Electrical Noise	☐ Potential to Cause a False Alarm		☐ Vibrations
	☐ Impacts Facility Use Agreement		☐ Temperature Change	☐ Other
☐ Configuration Control	☐ Maintenance Work on Ventilation Systems		☐ Utility Interruptions	
WORK CONTROLS				
Work Practices				
☐ None	☐ Exhaust Ventilation	☐ Lockout/Tagout	☐ Spill Containment	☐ Security (see Instruction Sheet)
☐ Back-up Person/Watch	☐ HP Coverage	☐ Posting/Warning Signs	☐ Time Limitation	☒ Other: Magnet Operational Lockout and survey
☐ Barricades	☐ IH Survey	☐ Scaffolding-requires inspection	☐ Warning Alarm (i.e. "high level")	
Protective Equipment				
☐ None	☐ Ear Plugs	☐ Gloves	☐ Lab Coat	☐ Safety Glasses
☐ Coveralls	☐ Ear Muffs	☐ Goggles	☐ Respirator	☐ Safety Harness
☐ Disposable Clothing	☐ Face Shield	☐ Hard Hat	☐ Shoe Covers	☒ Safety Shoes ☐ Other
Permits Required (Permits must be valid when job is scheduled.)				
☒ None	☐ Cutting/Welding	☐ Impair Fire Protection Systems		
☐ Concrete/Masonry Penetration	☐ Digging/Core Drilling	☐ Rad Work Permit-RWP No		
☐ Confined Space Entry	☐ Electrical Working Hot	☐ Other		
Dosimetry/Monitoring				
☒ None	☐ Heat Stress Monitor	☐ Real Time Monitor	☐ TLD	
☐ Air Effluent	☐ Noise Survey/Dosimeter	☐ Self-reading Pencil Dosimeter	☐ Waste Characterization	
☐ Ground Water	☐ O_2/Combustible Gas	☐ Self-reading Digital Dosimeter	☐ Other	
☐ Liquid Effluent	☐ Passive Vapor Monitor	☐ Sorbent Tube/Filter Pump		
Training Requirements (List below specific training requirements)				
PHENIX Awareness, CA Access				
Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:			**If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)**	
ES&H Risk Level:	☒ Low ☐ Moderate ☐ High		WCC:	Date:
Complexity Level:	☒ Low ☐ Moderate ☐ High		Service Provider:	Date:
Work Coordination:	☒ Low ☐ Moderate ☐ High		Authorization to start	Date:
			(Departmental Sup/WCC/Designee)	

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed): See attached Installation Procedure
Special Working Conditions Required:
Operational Limits Imposed:
Post Work Testing Required:

Job Safety Analysis Required: ☐ Yes ☒ No	Walkdown Required: ☐ Yes ☒ No

Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.

Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator	Don Lynch		20146	
Service Provider				
	Review Done: ☐ in series	☐ team		

4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

5. Departmental Job Supervisor, Work Control Coordinator/Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required. ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

7. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)
a) WCM/WCC: Is any feedback required? ☐ Yes ☐ No

b) Workers: Are there better methods or safer ways to perform this job in the future? ☐ Yes ☐ No

8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)

Name:	Signature:	Life#:	Date:
Comments:			

HBD Installation Procedure (To Install in CM region of PHENIX IR)

(Note: the following sequence assumes that the west and east detector installations will be performed sequentially allowing for separate delivery of the east and west detector modules. Should the east and west detectors arrive together, the instructions below may be performed concurrently.)

I. West Detector section

a. Prepare gas system for installation of HBD (flow CF4 at a flow rate of 10 l/min for at least 4 hours prior to installation of detector. (Note: Operating flow rate is ~ 1.5 l/min.)
b. Pre-install upper and lower aluminum rails for detectors and cable management.
c. Receive detectors as delivered from Stony Brook at PHENIX
d. Disconnect transport gas bottle from west detector and cap west detector ports.
e. Verify that PHENIX magnets are locked out of operation
f. Open west carriage for access to CM region.
g. Install 3 way purge valves on HBD inlet and outlet lines.
h. Move HBD West Detector to CM region, carefully lift detector over HBD LV/signal rack and onto CM lifting platform
i. Orient detector in upright position and lift onto aluminum rails and secure mounting feet as designed in retracted position such that window of detector faces beampipe. (see figure)
j. Attach supply and return piping, purge supply and return lines using 3 way valves and establish flow to detector.
k. Install cable management trays and tray structural supports for west detector to cable management rails . Attach handles to cable and detector mounting supports.
l. Attach west detector HV and signal cables and secure cables in cable trays.
m. Install UV lamp ????
n. Perform magnet surveys if and as required by CA cognizant engineer(s).
o. Electrical/operational checkout tests per plan.

II. East Detector section

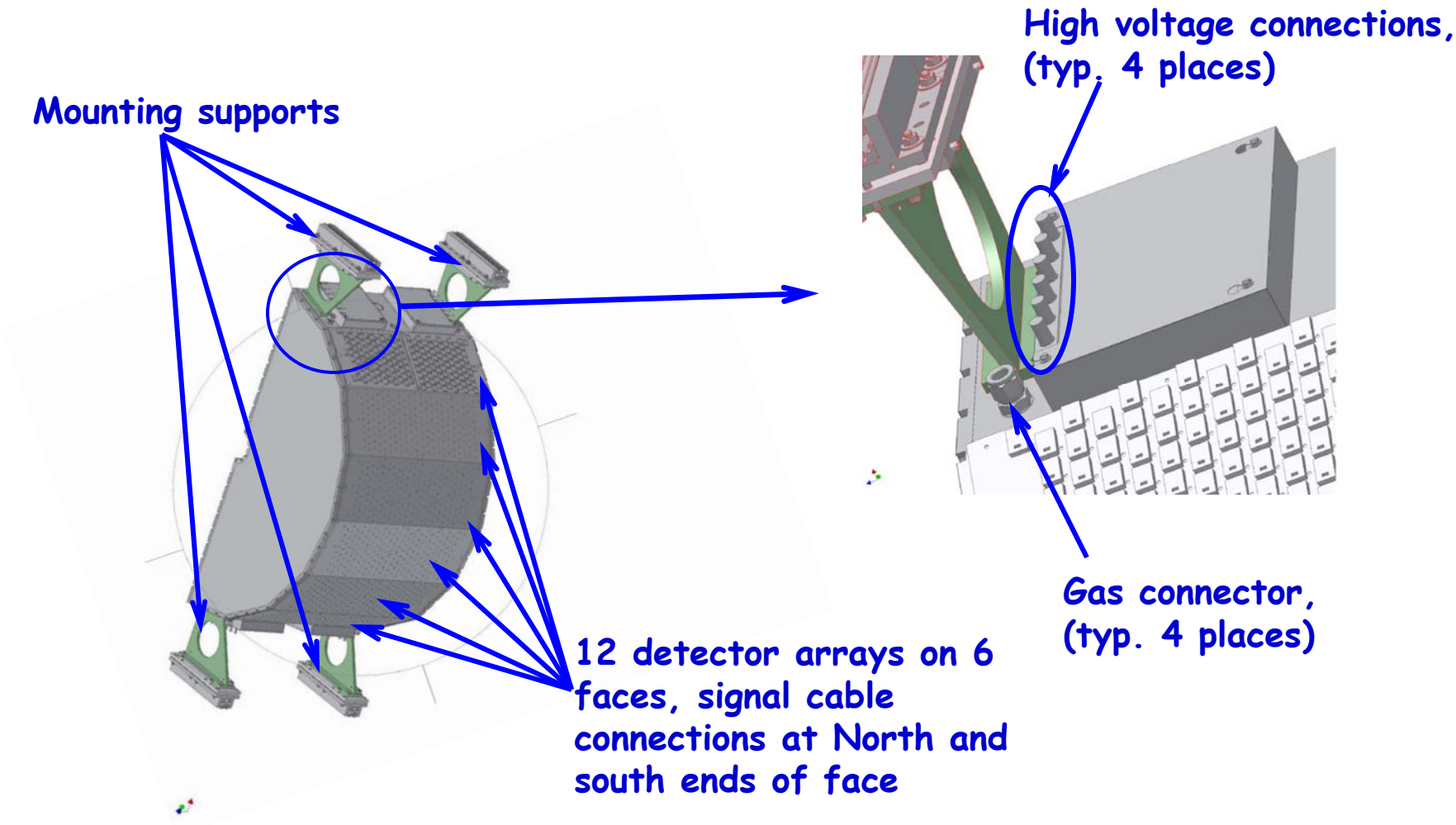
a. Repeat steps c through o for the east detector

See the attached diagrams for further information.

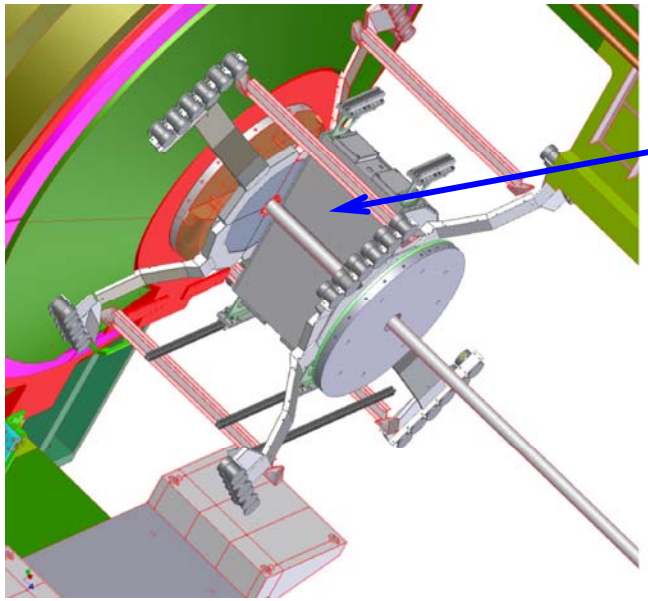
Notes:

1. The HBD prototype utilizes an external UV lamp and power supply for test/calibration of the detector. This lamp will be mounted in a location TBD below the HBD installation with a light tube conduit to direct light into an optical window into the detector located at the north or south end of the east and west detector sections.

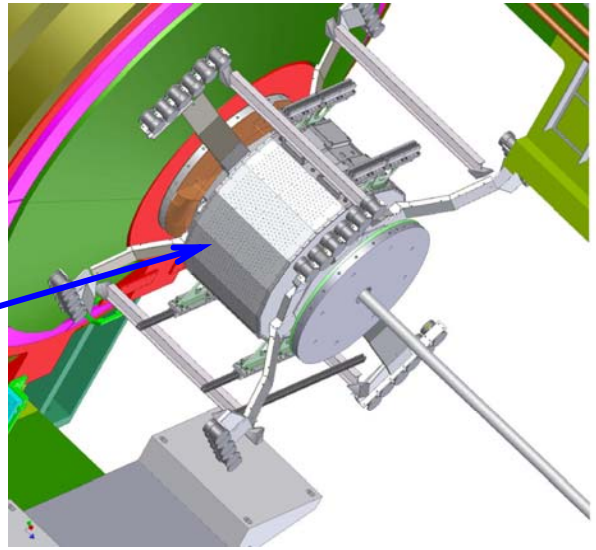
HBD Detector



HBD Installation



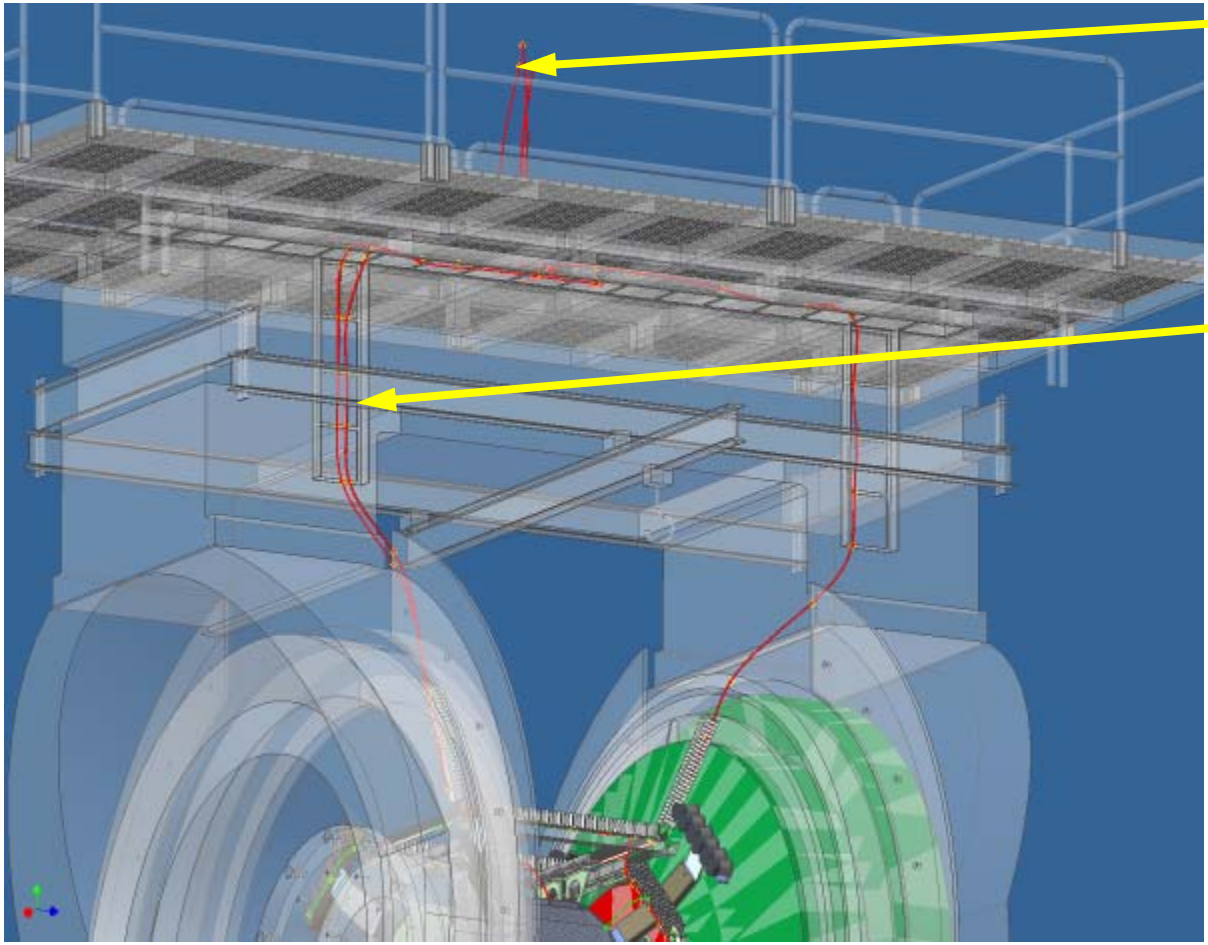
1. HBD West detector installed



2. HBD East detector installed

(North CM poleface omitted for clarity)

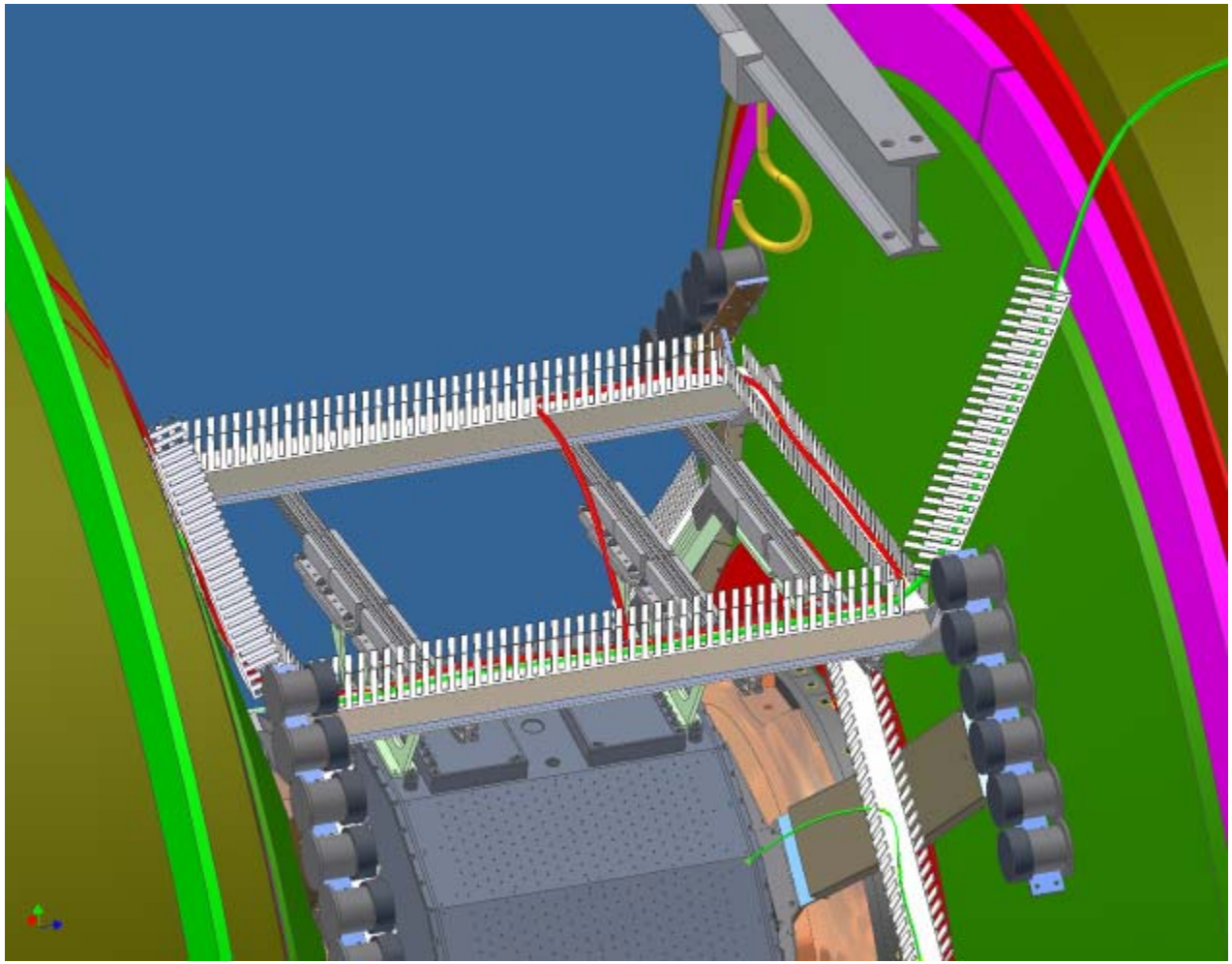
RXNP & HBD Cable Routing 1



HBD HV & RXNP racks on Bridge near center

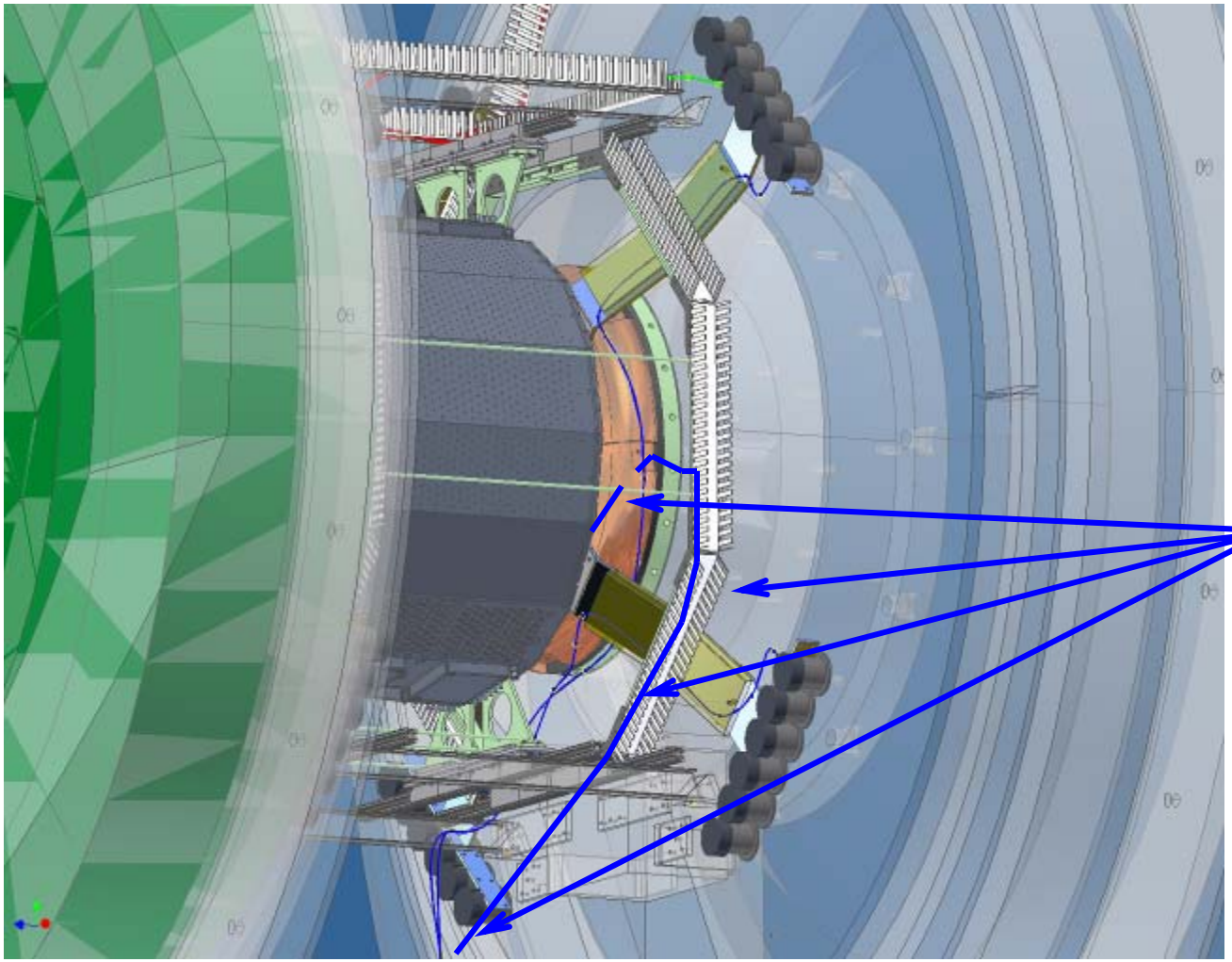
HBD HV Cables routed on upper southeast face of CM flux return

RXNP & HBD Cable Routing 2



RXNP cables come down from top of CM south pole face to west upper i-beam, ¾ cross over to east upper i-beam and ½ cross to north pole face (Mirror image of RXNP routing).

RXNP & HBD Cable Routing 3



HBD signal cables come from HBD signal rack (lower central east side of CM region) to U-shaped hoizontal aluminum cable tray, to distribution panduit flexible cable trays (east and west, north and south sides) and finally routed to detector module signal connectors